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Acronyms & Abbreviations

BCDE	Blum Center for Developing Economies
CEGA	Center for Effective Global Action
Dev Eng	Development Engineering
DIL	Development Impact Lab
DMSP	Distance Mobile Survey Project
DySPAN	Dynamic Spectrum Access Networks
ECAR	Electrochemical Arsenic Remediation
EPFL	Swiss Federal Institute of Technology
GCFSI	Global Center for Food Systems Innovation
GSM	Global System for Mobile Communication
HESN	Higher Education Solutions Network
HVAC	High Value Areas of Collaboration
ICT	Information & Communication Technology
IPA	Innovations for Poverty Action
LBNL	Lawrence Berkeley National Lab
LIGTT	LBNL Institute for Globally Transformative Technology
M&E	Monitoring and evaluation
NGO	Non-Governmental Organization
ODK	Open Data Kit
PDEL	Policy Design and Evaluation Lab
PI	Principal Investigator
POC	Point of Contact
QI	Qualcomm Institute
R&D	Research and Development
RCT	Randomized Controlled Trial
REPP	Rural Electrification Power Project
STIP	Science, Technology, Innovation, and Partnership
TIER	Technology & Infrastructure for Emerging Regions
UC	University of California
UCB	University of California, Berkeley
UCSD	University of California, San Diego
UNESCO	United Nations Educational Scientific and Cultural Organization
USAID	United States Agency for International Development
VBTS	Village Base Station
WCS	We Care Solar

Executive Summary

The Development Impact Lab (DIL) is an international consortium of universities and research institutes, non-governmental organizations (NGOs), and industry partners addressing global poverty through advances in science and engineering. Headquartered at the University of California (UC) Berkeley, and launched with support from the US Agency for International Development (USAID), the Lab designs "development solutions" that couple innovative social and market interventions with cutting edge technological advances. These solutions are then rigorously evaluated in the field, with proven solutions transitioned to partners for scale-up and dissemination. The Lab is led by two physical centers on the UC Berkeley Campus: the Blum Center for Developing Economies and the Center for Effective Global Action (CEGA). Together, these units have created a vibrant hub for the broader DIL network.

This semi-annual report highlights the Lab's activities from October 1, 2013 to March 31, 2014 (representing the early part of DIL's second year in operation). During this period, the Lab has expanded its Research and Development (R&D) portfolio, supporting 30 projects in all. These projects span the pipeline—from early-stage design and piloting, to evaluation and iterative redesign. The portfolio includes novel solutions for energy, water, health, housing, governance, and other priority challenges. Projects have been sourced through grant competitions, with four contests launched in the period covered by this report. The competitions attracted 150 applications in all, from researchers at the University of California and other institutions within the DIL consortium.

Lead actors within the consortium include the Technology and Infrastructure for Emerging Regions TIER) Group at UC Berkeley, which is developing a platform for real-time measurement of development outcomes (along with colleagues at University of Washington, University of Michigan, and Portland State University); and the Policy Design and Evaluation Lab (PDEL) at UC San Diego, which oversees DIL's work on governance-related Information and Communication Technologies (ICTs). Of note, PDEL managed the Lab's Spring 2014 Innovate grant competition, which focused on ICT. The LBNL Institute for Globally Transformative Technology (LIGTT) is also an important partner, leading a forecasting effort to identify technological breakthroughs needed to advance development.

DIL's strongest link to other Labs in USAID's Higher Education Solutions Network (HESN) is Makerere University, which is both a sister HESN Lab and a university member of DIL's consortium.[1] Other members of the consortium include the Indian Institute of Technology Bombay, Jadavpur University, University of Washington, Portland State University, University of Michigan, and Stanford University. DIL has also worked closely with NGO partners like BRAC, the Aga Khan Development Network, and IDEO.

In the current period, DIL has continued to engage deeply with USAID partners. The Lab has supported active collaboration with agency professionals, including the hosting of site visits, engagement of mission staff in field research, and involvement of a diverse array of stakeholders in competitions and grant making.

[1] Makerere University's Principal Investigators are automatically eligible for all DIL competitions including Innovate and Explore. Professor Edward Kirumira, Dean of Faculty of Social Sciences at Makerere University, serves as a key faculty advisor to DIL and brings extensive field research experience to the DIL ecosystem. In addition, Professor Kirumira assists with outreach and support for DIL competitions on the Makerere campus.

Part 1: Key Activities

1.1. Summary of Key Activities

DIL fosters activities that fall within four objectives:

Pillar1:
Demonstration Portfolio

A portfolio of DIL demonstration projects was created in Year 1 and continues to evolve in Year 2. These relatively mature projects were selected for their promise to deliver real and measurable impact within 5 years. The projects also illustrate the new discipline of "Development Engineering," which integrates technological advances with novel economic, institutional, and behavioral interventions. Projects receive from $125,000 to $450,000 per year and are closely monitored to enable rapid identification of successes and failures, which may reduce risk for follow-on investors.

Pillar 2:
Innovation Pipeline

To better source, assess, and advance promising innovations for global development, DIL has established a series of competitions open to researchers in the DIL consortium. Technologies and interventions identified through these contests are building a rich pipeline of projects at each stage in the development process—from early ideation and field testing to redesign, manufacture and scale-up. Between October 2013 and March 2014, DIL administered four competitions, resulting in over 150 applications. The Lab has made 30 awards to date, ranging from modest seed grants to $200,000 awards.

Pillar 3:
Measuring Impact

Development innovators need tools to rigorously and rapidly evaluate new interventions in the field, using high quality Monitoring and Evaluation (M&E) data. Being able to measure effectiveness and quickly iterate on designs can drive efficiency in the R&D process. To make high quality, high frequency data more accessible and affordable, DIL is building a kit of tools for data collection, management, analysis, and visualization. Central to this is the Mezuri Platform, a web-based computing tool for aggregating and storing data from surveys, sensor networks, and mobile devices.

Pillar 4:
Ecosystem for Development Engineering

DIL fosters an ecosystem for development innovation, collaboration, and knowledge sharing at UC Berkeley and beyond. This ecosystem aims to guide universities' roles in global development. Between October 2013 and March 2014, DIL sponsored a large-scale conference on research methods, hosted several research seminars and salons, and supported an HESN-wide student contest. The ecosystem is also supporting academic courses and publications. These activities have connected the Lab with more than 400 students, researchers, and practitioners.

1.1.1 Portfolio of Demonstration Projects

At DIL's core is a new way of innovating for international development. The Lab seeks to change the way universities design solutions for the challenges of poverty. This includes closer collaboration with development professionals, speedier translation of proven interventions to partner organizations, and extensive learning across projects. Highlighted in this report are the Lab's key activities from October 1, 2013 to March 31, 2014. These include a portfolio of demonstration projects and a pipeline of new ideas sourced through DIL competitions. Each project falls at a different stage in the innovation pipeline, and receives up to three years of funding (with awards ranging from $5,000 for early-stage exploration to $450,000 for mature demonstration projects). All projects are intended to contribute to the establishment of the emerging field of Development Engineering (Dev Eng).

"DEVELOPMENT ENGINEERING" DEMONSTRATION PROJECTS

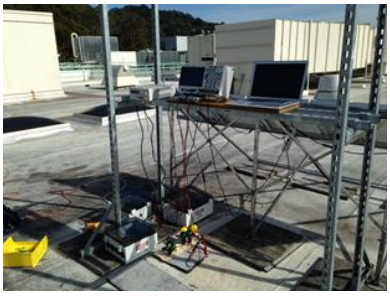
The role of science and technology in driving breakthroughs in international development has long been recognized, yet there is little understanding of what contributes to the success (or failure) of technology-based development solutions. Increasingly, engineers, development practitioners, and others are recognizing the ways in which social and economic barriers such as market failures and weak institutions can prevent potentially transformative innovations from reaching the world's poor. DIL's Dev Eng approach aims to integrate insights from development economics with world-class science, engineering, and social science research, to generate sustainable, technology-based solutions to development challenges. The portfolio of demonstration projects outlined below serves as an example of this approach. All of the Dev Eng demonstration projects are led by principal investigators (PIs) at UC Berkeley.

DEVELOPMENT ENGINEERING Demonstration Projects

The **Rural Electrification Power Project** (REPP) is testing new mechanisms for providing electricity to the rural poor. The project works with the government and private sector partners in India and Kenya to integrate "smart" metering technology and sustainable (pay-as-you-go) business models into grid and off-grid power installations. The project generates real-time data on household power consumption and willingness to pay and is also rigorously measuring the social and economic impacts of electrification.

The Kenya field team is experimenting with subsidies for household connection to the national grid. It has completed over 1,000 baseline surveys in 61 transformer communities in Western Kenya, and is currently finalizing plans for the distribution of varying subsidies to households, in close partnership with the Rural Electrification Authority.

The India team is testing the effectiveness of solar AC microgrids in delivering affordable power to rural, off-grid villages. To identify villages for potential microgrid installation, the team has designed surveys, research protocols, scripts, and software using Android tablets. In each "treatment" or "control" village, the team will hold an information session to introduce the microgrids; field an attitude survey to measure interest; survey land to determine feasibility of microgrid installation; and conduct a door-to-door household survey to assess willingness to pay for electricity. Meanwhile, a DC microgrid team has carried out a first round of experimental testing with a small scale PV system at UC Berkeley.



The experimental setup of the DC microgrid with a single MPPT converter connected to two independent PMUs.

Community members awaiting the start of an informational meeting.
PIs: Brewer, Miguel, Wolfram

The **CellScope** is a mobile digital microscope for diagnosis of disease in remote settings, by non-expert health workers. The easy-to-use device can rapidly capture images in blood, sputum, and other patient samples, using the mobile phone's computational power to analyze images, automatically render a diagnosis at the point-of-care, and wirelessly transmit data to clinical centers. Two applications are being piloted with DIL's support: one for diagnosis of *tuberculosis* in Vietnam, and another for diagnosis of *loiasis* in Congo.

The Cellscope team's collaborators recently completed a 300-patient evaluation of the CellScope Loa loa diagnostic system in Cameroon, demonstrating excellent agreement with gold-standard thick smear microscopy. Cellscope continues to refine the video processing algorithm to extend its dynamic range and sensitivity. The team is currently preparing a manuscript for publication describing the microscope hardware, video processing algorithm, and the results of recent experiments in Cameroon.

CellScope Loa Diagnostic System
PI: Fletcher

The **Village Base Station** (VBTS) project is developing a low-cost, lower power infrastructure for cellular communications in remote places without coverage by mobile network operators. This Global System for Mobile Communications (GSM) "network in a box" is built on OpenBTS, an open source Unix application. VBTS makes it possible to install and operate community cellular networks at a fraction of the cost and power consumption of traditional telecom infrastructure. The technology is being piloted in Papua, Indonesia, and Mexico.

Recently, the VBTS team published a paper on Dynamic Spectrum Access Networks (DySPAN), which describes the use of GSM whitespace to operate a base station. This has received attention from both academics and industry. The team has built a complete prototype GSM whitespace base station now in testing in Berkeley. The team also has met with mobile carriers in Afghanistan and Pakistan to discuss deployments in remote regions of these countries. In South Africa, the team has secured an agreement from the regulator (ICASA) and a carrier to do a real-world trial of GSM whitespace. This deployment is currently in the site selection phase, and the team has identified three promising locations.

Prototype GSM whitespace base station.
PIs: Brewer, Parikh

Electrochemical Arsenic Remediation (ECAR) for Safe Drinking Water is a novel technology producing arsenic-safe water in a sustainable and scalable manner. The innovation applies an electric charge across steel plates, which precipitates arsenic as rust particles, allowing for effective filtration. It is being piloted in West Bengal, India in rural areas with almost no technical support. In preparation for ECAR's 2014 field trial, India-based team members have completed initial experiments for optimization of a new ECAR reactor. One member of the India team visited the U.S. for a month, to carry out design discussions for the new reactor and to learn rigorous experimental techniques that will be used in the trial. Several key components of the new reactor design are now complete.

A paper on ECAR's earlier field trial was published in *Science of the Total Environment*. A conference paper was accepted to the UNESCO Technologies for Development Conference, drawing on lessons learned from several earlier efforts.

ECAR field supervisor and technical specialist from India, Sreeman Mypati, is visiting UC Berkeley lab for one month to help design the latest prototype and learn rigorous lab techniques to take to the field.
PIs: Amrose, Gadgil

We Care Solar (WCS) is an economical, portable power unit that provides off-grid health workers and clinics with efficient medical lighting and power for communication and medical devices. In the current period, the team has created partnerships with a variety of agencies and aims to compare the progress and outcomes of programs in different countries.


Install day in Kabale, Uganda.

Uganda: As part of the "Saving Lives at Birth" Grand Challenge, WCS conducted Phase II of the amref Health Africa Uganda Solar Suitcase program in Southwest Uganda. Seven WCS staff and Solar Ambassadors conducted hands-on classroom trainings and coached district health staff on how to teach and install Solar Suitcases in health facilities. The new trainees are continuing this work with the aim of equipping over 100 health facilities with maternity care lighting and phone/computer charging.


Graduating Class in Kabale, Uganda - February 2014

Malawi: Following up on a 2013 pilot program, WCS is partnering with USAID's Support for Service Delivery Integration-Services Project (led by Jhpiego) to bring 40 Solar Suitcases to maternal health facilities. A hands-on classroom training program was conducted in Lilongwe with 23 Department of Health staff and staff from Save the Children, Jhpiego and CARE, before conducting supervised installations in 10 health facilities. In this program, WCS is testing out longer-lasting battery technology (Lithium-Ferrous-Phosphate) and newly designed LED lights.


We Care Solar with Tanz Solar partners

Ethiopia: A Solar Suitcase program was initiated with Hamlin College of Midwives and Kissito Healthcare International, supported by Greenlamp, a Swiss NGO committed to improving maternity care in Ethiopia. WCS staff conducted a training at Hamlin College and then oversaw Solar Suitcase installations at four health centers.

Philippines: WCS conducted a site visit in post-typhoon Philippines as part of preparation for a Solar Suitcase program in partnership with Stiftung Solarenergie Foundation and the MacArthur Foundation. The program aims to support disaster relief and maternity care in affected areas with 100 Solar Suitcases.


Solar Suitcase in Lilongwe, Malawi.
PI: Stachel

Tanzania: WCS partners at Tanz Solar conducted a pilot Solar Suitcase program in local health centers after being trained in Berkeley. The plan is to grow this program with support from Tanzania Rural Electric Agency. WCS has identified two donors to support the next Solar Suitcase deployment.

The **Collective Assessment & Feedback Engine** (CAFÉ) is an online platform that provides users with dynamic visual feedback about their position on key issues, relative to other community members.


PI: Fletcher

CAFÉ completed a preliminary version of the platform in Berkeley. A pilot was carried out with the California State government, using the application to generate a grassroots evaluation of the state government's performance. The team received responses from more than 8,000 participants from all counties of California. Among the nearly 400 suggestions submitted, several topics of concern emerged, including the State's level of preparedness for natural disasters. Based on this, the Lt. Governor's office is planning to convene a task force or take other action to address the issue, and the topic will be the focus of the California Report

Card version 2, to be launched later this summer.

Moving forward, the team is currently designing implementations of CAFÉ for use in Brazil and Rwanda. In Brazil, the team is in discussions with the Council on Science and Technology in Rio de Janeiro to develop a local version that will allow individuals to advise the government on timely policy issues. In Rwanda, the team is working with faculty at the University of Rwanda to design CAFÉ for assessing neonatal and antenatal healthcare service programs in rural community health centers.

"ICT FOR ACCOUNTABILITY" DEMONSTRATION PROJECTS

A sub-portfolio of demonstration projects is managed by the Policy Design and Evaluation Lab (PDEL), which is DIL's hub at UC San Diego (UCSD). This set of projects focuses on ICT for Accountability (ICT-A), exploring ways to activate mobile networks to measure and promote accountability in public service delivery. The portfolio leverages the rapid expansion of ICT in the developing world, which has great promise to reduce poverty and accelerate citizen empowerment. PIs for these projects are based at UCSD and other institutions in the DIL consortium.

In the current reporting period, a number of new projects were supported by DIL. Detailed updates of Year 1 and Year 2 ICT-A portfolios are in the table below. It should be noted that this portfolio is heavily co-funded by other donors, with DIL support providing catalytic resources to pilot a new technology, redesign an existing technology, or expand into new developing regions. In this way, DIL is leveraging investment by other donors to achieve scale.

Year 1 ICT FOR ACCOUNTABILITY Demonstration Projects
Optimizing Fieldwork for the Mobile Era (PI: Niehaus) Conducting traditional research surveys in developing countries can be labor-intensive and costly, and the end result can lack nuance and multi-dimensionality. Mobile phones are increasingly being used by researchers to conduct surveys cheaply and dynamically, particularly in low-resource settings. This project attempted to use mobile phones to administer long-term follow-up surveys and achieve high-frequency data collection. The study found that mobile surveys have relatively high response rates compared with traditional in-person surveys, with a response rate of 95% for high-frequency calls and 82% for low frequency calls (compared to the in-person response rate of 93%). In addition, it is also found that although response rates are insensitive to doubling incentives, one must pay careful attention to the type of question, type of mobile survey and attrition when designing surveys that include mobile administration Key lessons are the importance of the question and survey types that can be administered using mobile phones. Attrition is also an issue. In conclusion, the study suggests that mobile surveys can be administered at a fraction of the cost of in-person questionnaires, with high response rates, and they can be deployed with relatively high frequency.
M-Pasandaaz (PI: Callen, UCLA) This project developed and piloted a novel mobile phone-based savings account ("M-Pasandaaz," or M-Savings) that enables subscribers in Afghanistan to deposit and accumulate balances in a phone-based savings account. Critically, the project also evaluates the uptake of M-Pasandaaz using a randomized controlled trial (RCT). Although Afghanistan was the second country in the world, after Kenya, to launch "mobile money," uptake and usage remains low. Additionally, only 3% of the adult population in Afghanistan uses a bank savings account. This multi-year project is funded by multiple sponsors and continues to progress.

Mobile Monitoring for Elections (PI: Gibson, UCSD)
This project aimed to redesign how citizens can hold their politicians accountable through free and fair elections. The project refined a smartphone application to enable citizens to monitor the 2013 Kenyan national elections in real-time using digital image collection and cloud-based computing. The project is in the initial stages of constructing its master database from very complicated sets of data. We hope to have analysis of the data towards the end of August 2014. Citizens were able to use the app to share provisional vote totals, provide pictures of the tally, and report theft of material or denial of monitor access. The app posted data on a dashboard before and after voting took place. This ongoing project will measure the effect of citizen monitoring by using a randomized controlled trial (RCT).

Distance Mobile Survey Project (DMSP) (PI: Driscoll, UCSD)
This project explored the potential of using long-distance survey methods as a supplement to in-person follow-up surveys, conducted in the field. Remote surveys are particularly important in post-conflict and conflict settings (like this study's location in Mogadishu, Somalia) since in-person follow up can be risky (both in terms of safety, and in terms of attrition due to household migration). The project used geospatial data to create an unbiased and representative sample of Mogadishu's residents. The aim was to demonstrate that the sample's representativeness could be maintained virtually, over a one-year period or longer. To deliver mobile phone follow-up surveys, the project utilized a Somali-language phone bank, organized by the Somali Youth League of San Diego. Follow-up surveys via mobile phones yielded results in near-real time, facilitating iterative redesign of intervention and evaluation strategies. The initial phase of the project, completed in 2013, demonstrated that 11% (85) of the 781 individuals initially selected into the study could be followed-up via cell phone sixteen months later. The persistence of this cell phone network has important implications for low-cost data collection, particularly in conflict and post-conflict areas.

Year 2 ICT FOR ACCOUNTABILITY Pilot Projects

Lowering Barriers to Election Using Mobile Technology in the Philippines (PI: Cruz, UCSD)
The project explores one way that technology can be used to increase participation in local elections, and in turn, increase competitiveness. Using a custom-built SMS system, the team is collecting data on individuals who are not currently planning on running for office, but for whom there is strong support among local voters. The team is using this system to facilitate the participation of nominated individuals in races for office. The program has been found to increase the number of candidates that run for office and to generate increased interest in the election, illustrated by higher turnout. It will soon be known whether the entrance of these new candidates also resulted in tighter races.

Conducting Market Agricultural Surveys via Mobile Phones (PI: McIntosh, UCSD)
A market survey, now in development, is being supported by DIL as an integral part of a large RCT in Uganda that seeks to understand how the digital backbone provided by the Grameen Foundation's Community Knowledge Worker program can be used as an agricultural trading platform, allowing farmers to order inputs and sell outputs in bulk, and to receive information on prices across different markets in the country. The team will work with Innovations for Poverty Action (IPA) to conduct a census of traders in 300 markets that are relevant to the study population, at a frequency of every two weeks from July 2014 through June 2016. IPA will handle the logistics of the survey itself, supported by grant funding from the Agricultural Technology Adoption Initiative (managed by CEGA) and the HESN Lab at Michigan State University. DIL funding is being used to build the automated systems that will send out market surveys to traders via SMS, check data quality using a back-end system, and then push out payment to traders as mobile airtime. The team expects to have a testable version of the software by the beginning of May 2014.

Somalia Distance Mobile Savings Project (PI: Driscoll, UCSD)
This project replicates a survey carried out in Somalia's capital in Fall 2013. The project will support a Somali-language phone bank, organized in collaboration with the Somali Youth League of San Diego that will operate in parallel with call-backs with a sample of numbers collected in 2012. The goal of the survey is to assess civilian welfare in the city of Mogadishu. . A first round of call-backs to study participants, by mobile phone, will happen just 1-2 days after the initial on-the-ground contact. A procedure for validating the identity of the respondent while keeping the identity anonymous (via a secret phrase or number) will increase confidence in the data. Due to volatility in the region, this pilot project has been placed on hold until the security situation improves in Somalia.

Digital Data Collection in the Bihar Cash Transfer Project (PI: Niehaus, UCSD)
The Bihar Cash Transfer project seeks to use mobile communications to collect data on a pro-poor cash transfer program in India. The team has completed baseline and end line surveys as well as program implementation. Moving forward, this project will develop, deploy, and refine techniques for continuous tracking and monitoring of data from the field. The main objectives of this exercise are to: (1) Have continuous visibility on program implementation and process outcomes in addition to baseline and end line surveys to measure impact. (2) Obtain high-frequency data on key outcome measures that may exhibit substantial seasonal variation (including farm and non-farm labor, migration, food consumption, and nutritional status). This will allow the team to observe process and outcome variables over a 12-month cycle. (3) Sharply increase the effectiveness and quality of field data collection.

Remote Monitoring of Competition between Government Service Providers (PIs: Niehaus and Muralidharan, UCSD)
The project is building software for a call center to be used in monitoring government service providers in India. The software is being designed so that a simple user interface can be used for monitoring by call center executives. The team is partnering with an organization called Exotel, a cloud telephony service provider for small and medium enterprises in India. Exotel also provides Application Program Interfaces to developers and technology teams to develop third party applications. The team is customizing requirements including the issuance of tracking systems, creation of databases, and population of certain lists of callers on the Kreato Customer Relationship Management system. Second, the team is creating the ability to manage outbound communication to beneficiaries. Outbound communication is being leveraged to assist beneficiaries to enroll in biometrically linked bank accounts through which they can cash out government-provided food coupons, on demand. About 80% of the project's sample has access to a mobile phone. Beneficiaries will be called by the research team, to understand progress they have made in the various stages of biometric card enrollment – from form submission to biometrics registration to card delivery. The service will also provide assistance to beneficiaries in the process of opening an account.

Making Remittances Work: Using Mobile Technology to Direct Remittances Toward Secondary School Fees (PI: Adida, UCSD)
This project proposes an intervention aimed at addressing three obstacles in the sustainability and impact of foreign remittances: high transaction costs, control[2], and cultural norms in the Borgou region of Benin. The intervention is a system of direct remittances for secondary school fees. The project's innovation combines a technological and an institutional characteristic: mobile technology ensures low-cost transactions; and schools, rather than individuals, will be on the receiving end, maintaining control in the hands of the remittance-sender, and circumventing the social pressure senders might face by allowing them to send remittances remotely, privately, and directly.

[2] By control, we mean control of what remittance-recipients do with the remittance money. So the problem we highlight is that those who send remittances may want remittances used for a certain purpose, but have no control over how it is used by the recipients.

Novel Ozone and Aerosol Exposure Maps for Integrated Climate, Health, and Agricultural Impact Assessments (PI: Burney, UCSD)
This project creates time-resolved maps of ozone and aerosol (particulate) exposure for the continental U.S. for use in agriculture and health impact assessments. Creation of this database will allow the project to address the issue of teasing apart the impacts of black carbon and ozone using existing satellite data and ground-based data (such as air quality monitoring data). The research group has developed methodologies for solving the two problems noted above and has piloted them at small scale, with success. The team will begin by prototyping this approach for California, for future deployment in developing regions.

Using High-Resolution Satellite Data to Evaluate the Impact of New Business Formation (PI:Hanson, UCSD)
This project develops new techniques for evaluating the impact of new business formation on local economic development using ultra high-resolution multi-spectral satellite images. Using Gujarat, India, for the pilot study, the results will provide new methods for studying the impact of rapid urbanization on socio-economic levels at a global scale.

Election Research Project in South Africa (PI: Gibson, UCSD)
The team is adapting findings from Kenya to apply smartphone monitoring in the South Africa elections. Working with Democracy International, the team has explored five core topics: (1) methodology, findings, and lessons from UCSD's previous experimental research in Afghanistan, Uganda, and Kenya; (2) the proposed project design for South Africa, with adaptations to build upon previous studies and address a precise electoral need in South Africa; (3) South African post-Apartheid electoral politics and electoral system design; (4) information and communication technologies, crowdsourcing tools, and their potential utility for election monitoring; and (5) operational roles and responsibilities for project implementation.

1.1.2 Pipeline of Development Innovations

To build a rich pipeline of innovations that can be picked up by other donors (for further development), DIL has administered 4 competitions, all in the current reporting period, resulting in over 150 applications and 30 awards.

In Fall 2013 and March 2014, the Lab accepted applications for its "DIL Explore" seed grant competition, making awards of $5,000 to pilot new ideas and establish international collaborations. These projects are intended to seed the pipeline with several early-stage ideas. Together, nearly 70 applications were submitted and approximately 16 awards made. Applicants came from a range of disciplines, with most awards made to UC Berkeley PhD students and postdoctoral fellows.

Alongside the "Explore" competition, two rounds of the Lab's "DIL Innovate" competition have been administered. This program sources and supports more mature technologies and interventions that demonstrate promise for real-world impact and scale-up. The Fall 2013 call yielded 48 applications, of which 13 were eventually funded at planning ($40,000), pilot ($70,000) or program levels ($200,000). The review process ensured that each application was read by three experts, one from each of three panels: social science, technical/engineering, and external stakeholder/practitioner. In total, 21 expert reviewers contributed to the Fall 2013 review process. Two of the seven practitioner reviewers were USAID representatives. One was an HESN program manager, providing a Washington, DC perspective; the other was a Science and Technology Advisor providing a mission perspective. Final decisions on which projects to fund were taken by 5 faculty members at UC Berkeley (including most of the key personnel for this cooperative agreement). The Spring 2014 "Innovate" competition is currently in progress; as discussed earlier, this competition is managed by PDEL and focuses on ICT for development. DIL regularly engages with our HESN/USAID colleagues throughout the competition process. Specifically, Mission STIP POCs, Regional Bureau STIP POCs, and Desk officers in countries

where projects were proposed were consulted. Approximately 20 USAID colleagues will provide feedback during the competition cycle. In addition, at least one USAID colleague serves as a representative on our peer review panels.

NEW PROJECTS IN THE PIPELINE

Three projects in the DIL Innovate Fall 2013 competition were selected to receive substantial funding (at the $200,000 level). These projects are highlighted below.

DIL INNOVATE – New solutions sourced through DIL competitions

The **Affordable Recycled Modular Roofs** project in India brings together researchers from Civil and Environmental Engineering and the Center for Green Chemistry at UC Berkeley to rapidly accelerate development and eventual impact of "Re-Materials" modular roofing tiles. Collaborating closely with manufacturers, salesmen, and future customers will help ensure that the product meets real needs with a proper focus on rapid scale-up. The team will understand and optimize the tile strength as a function of density and thickness, develop and field test a biomimetic environmentally friendly chemical additive to increase water resistance, and develop an improved energy efficient method to quickly dry tiles, reducing manufacturing costs significantly.

Model roof section using prototype ModRoof Tiles, installed in Fall 2013
PI: Amrose, UCB

The **High-Resolution Development Indicators** project will develop, calibrate, and benchmark a set of methods for measuring and predicting several key development outcomes, at the individual and regional level, in cross-section and over time, using high-frequency "digital race" data. The team will create an original dataset that captures, twice a month for 6 months, self-reported development outcomes for individuals across Afghanistan, validate predicted development indicators, develop a model for predicting an individual's wealth among other relevant individual-level development outcomes based on mobile phone records, and test, for the first time, the extent to which high-resolution digital data can be used to predict changes over time in an individual's wellbeing.

Focus Group conducted in Summer 2013
PI: Blumenstock, UW

The **Information and Intermittent Water** project evaluates the effects of a new text-message based notification system offered by Nextdrop, a social enterprise that provides text message-based notification service alerting consumers when water will be delivered. The team will evaluate changes in households' abilities to cope with intermittent water supply and willingness to pay for utility services in the context of Nextdrop's rollout in Bangalore, India. During 2014, the research team will conduct qualitative research on the organizational and political factors in Bangalore that may influence the effects of Nextdrop's services. The team will then conduct a household baseline survey in Bangalore to understand the amount of time that households typically spend waiting for water, their existing coping strategies with respect to intermittency, and the extent to which they are paying for utility services prior to receiving Nextdrop's services.

Woman collects water in Bangalore.
PIs: Post & Ray, UCB

DIL EXPLORE TRAVEL SPOTLIGHT

Will Tarpeh, a Fall 2013 "Explore" grantee and PhD student in environmental engineering, traveled to Nairobi, Kenya with team member Ryan Jung in January 2014 to work with Sanergy, Inc (a sanitation start-up supported by USAID). The students are mentored by Kara Nelson, a professor of civil and environmental engineering at UCB. Their work focuses on developing a sustainable business model for the treatment of potentially pathogenic waste from on-plot and home toilets. Tarpeh and team used their Explore grant to pilot test new services with users, identify key inputs, and develop a framework for refining and evaluating the business model. In Tarpeh's words, "The DIL Explore travel grant enabled my team to pivot our research from only focusing on the innovation - ammonia disinfection to recover nutrients from waste - to include new business development and a strategy for eventually bringing the innovation to scale."

1.1.3 Measuring Impact

DIL is driving innovation in the measurement of development impact through the Mezuri Data Platform. Mezuri is a collaborative effort led by Eric Brewer and the Technology and Infrastructure for Emerging Regions (TIER) group at UCB plus research groups led by Evan Thomas at Portland State University (PSU), Prabal Dutta at University of Michigan (UM), and Gaetano Borriello at University of Washington (UW). The team's goal is to enable the secure collection and analysis of data from development interventions, including high frequency field measurements gathered by constituent Mezuri technologies. The technologies include UW's Open Data Kit, a suite of software for Android phone- and tablet-based survey data collection, and sensor platforms from UM and PSU. Mezuri will also provide cloud-based tools for the storage, analysis, visualization, and sharing of the collected data. Below are some highlights from this effort.

UC BERKELEY TIER GROUP

The TIER group at UC Berkeley continued to coordinate and lead the integration of constituent technologies for the Mezuri Data Platform. These technologies were integrated into several projects, including sensors for cookstove use monitoring and smart meters for measuring electricity consumption (via the Rural Electric Power Project). The deployments are providing useful feedback into Mezuri's design and development. Additionally, select outside researchers are working with TIER and UW's Change Group to provide feedback (and needs assessments) for the next versions of the ODK cellphone based survey tools.

Screenshot of the GridWatch app

The TIER group at UC Berkeley convened an in-person meeting of the four Mezuri partners at PSU at the end of January 2014. An outcome of the meeting is a blueprint for building the 0.1 alpha version of Mezuri. In tandem, TIER has been working on the architecture of the first-stage Mezuri backend cloud database and processing engines.

TIER and the UM (see below) have also collaborated to develop and deploy Grid Watch, a smartphone application for crowd-sourced monitoring of electric grid outages (see below for further details). Together TIER and UM plan to deploy 15 national grid feeder monitors in Kenya, consisting of Android phones running Grid Watch. These data will be fed into the Mezuri cloud version of an existing

database. Grid Watch will ultimately be deployed at a larger scale, as part of an RCT in Kenya supported by DIL.

PORTLAND STATE UNIVERSITY

In year 1 of DIL, the PSU team further developed a suite of remotely reporting sensors, which are purpose-built for monitoring international development programs. The team worked with the Mezuri technical team to integrate the data reported by sensors that have already been deployed into a common data analysis and dissemination platform. The Mezuri team has used the PSU architecture as the baseline design for the Mezuri platform.

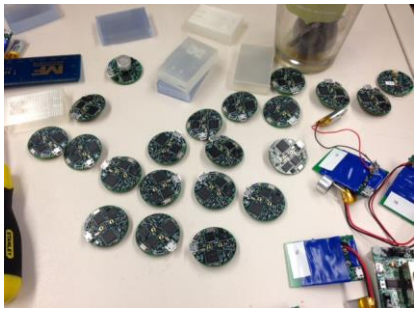
Demonstration of PSU sensors deployed on water filters, to measure user adoption

In November 2013, the SweetLab at PSU also participated in a number of events relevant to the HESN. Professor Evan Thomas attended the HESN TechCon at the College of William and Mary on November 17 and 18, and presented with other DIL co-investigators on progress and opportunities for collaboration. On November 5, the SweetLab was a panelist of Congressman Earl Blumenauer's International Water Forum hosted at Mercy Corps in Portland, Oregon. In March 2013, PSU PI Evan Thomas presented this work at a TEDx event in Santa Cruz in March 2013.

UNIVERSITY OF MICHIGAN

During the period spanning October 2013 to March 2014, the UM team has focused principally on three sensor technologies: (1) real-world social network tracking; (2) energy-harvesting energy meters, and (3) power grid monitoring using mobile phones. The team has also published several papers—one in collaboration with the TIER research team—based on work supported by USAID, including energy sub-metering [ACM Sensys'13], energy disaggregation [ACM e-Energy'14], mapping blackouts with smart phones [ACM HotMobile'14], and smoking detection using mobile phones and breath carbon monoxide sensors [Oxford Journal of Nicotine and Tobacco Research]. Finally, our recent work on social network tracking is under submission to ACM Sensys'14. These projects are further described below.

Social Sensing. Capturing the human inter-contact matrix allows one to understand real-world social dynamics and their implications in a number of areas, such as epidemiological studies, informal informational networks, and childhood social development. During the performance period, Michigan researchers have designed, prototyped, and deployed (at small scale) sensors that capture these interactions, backend cloud-based systems that gather and store the data, and queries and visualizations that permit researchers to pose a range of questions. These efforts have highlighted key challenges that the Mezuri backend must address to support to enable such mobile, intermittent sensor streams with limited connectivity and power.


A collection of "real-world social network tracking" sensors produced by Mezuri collaborator Prabal Dutta's group at the University of Michigan.

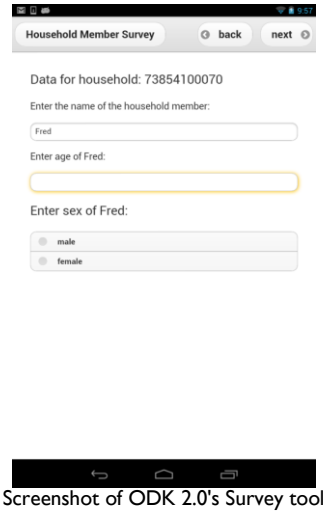
Energy-Harvesting Energy Meters. Energy and economic activity are tightly coupled. However, researchers have limited visibility into the energy usage patterns in emerging regions. Many factors conspire to make metering difficult, but one in particular that we focus on is the power of the energy meters themselves. Our recent work has explored passive, zero-power sensors that harvest the energy they need from the phenomena they sense. This allows us to deploy such sensors without concern for powering them. To evaluate the basic concept, we deployed approximately 100 passive energy-harvesting energy meters in our research lab and at several student homes. The data generated from this deployment has led to new data analysis and disambiguation algorithms. More importantly, the results from this work have highlighted the need for streaming analytics support in the Mezuri platform, which have been incorporated into the Mezuri architecture through an all-hands meeting in January 2014.

An energy harvesting energy meter sensor designed by Mezuri collaborator Prabal Dutta's group.

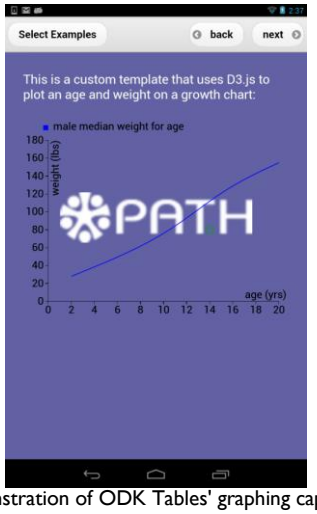
Power Grid Monitoring. The power grid is one of humanity's most significant engineering undertakings and it is essential in developed and developing nations alike. Currently, transparency into the power grid relies on information provided by utilities, and on more fine-grained insight provided by costly smart meter deployments. We provide greater visibility into power grids using an inexpensive, crowd-sourced technology (independent of utilities) that leverages existing smartphones. Our key insight is that an unmodified smartphone can detect power outages by monitoring changes to its own power state, locally verifying these outages using a variety of sensors, and corroborating with other phones through cloud services. This approach enables a decentralized system that can scale, potentially providing researchers and concerned citizens with a powerful new tool to analyze the power grid and hold utilities accountable for degradation in power grid quality. UM and TIER researchers have worked together to prototype the system, deploy at small scale in the US, and deploy it under realistic conditions in Kenya. Two key learning from this work are streaming support for Mezuri, and the ability to create a geographically distributed, delay-tolerant delivery network.

UNIVERSITY OF WASHINGTON

The UW team has made great progress in the further development and testing of ODK 2.0's tools. One of these tools is ODK Survey. ODK Survey provides new capabilities in data collection by providing much more dynamic surveys: the system can now extract content from both local and remote databases, and present users (i.e. survey enumerators) with optimized survey questions – including more appropriate response choices from which to select. In addition, surveys are highly customizable using HTML5 (rather than the more restrictive XForms model) which will also make the core tool much more easily portable to other platforms (for example, it can already be used from a web browser). Besides uploading data to a cloud-based server, ODK Survey also maintains a client-side database integrated with another new 2.0 tool, ODK Tables, so that the user can browse and display previously collected data (in presentations screens also customized via HTML5). ODK Tables has additional user-defined graphing functionality, a cleaner javascript API, and sync protocol changes. Both Survey and Tables have been beta-released and are in use by the team in trial deployments.



Screenshot of ODK 2.0's Survey tool



Demonstration of ODK Tables' graphing capability

Some of UW's other work during this time frame includes:

(1) Completing the 'application isolation' of ODK Survey. Application isolation enables forms designers to create and deploy multiple 'applications' to the same device and not have the forms for one show up on the screens of the other.
(2) Improving the form developer experience on ODK Survey and XLSXConverter. If a form is detected as having been materially altered, ODK Survey now alerts the user. Options are being added to clear the database when deleting a form definition.
(3) A detailed review of and revisions to the RESTful synchronization protocol between Tables and ODK's Server, in particular making everything fault-tolerant, idempotent, and recoverable.
(4) Combined release of ODK Tables, ODK Survey, ODK Aggregate, and ODK Application Designer plus documentation.

UC SAN DIEGO

In coordination with the broader Mezuri team, PDEL at UCSD is working closely with the Qualcomm Institute (QI) on the development of an open source software platform that can be used by ICT-A researchers. QI and PDEL have agreed to build the trunk of the platform by migrating Mshare functionalities (currently supported by the company Mindshare) to Open Data Kit (ODK). The migration will likely take time as there are features of Mshare that may prove to be difficult to transfer over. During the next few months, QI and PDEL will work closely on establishing a solid understanding of the relationship between Mshare and ODK in terms of relative capabilities. Some of the functions will already be incorporated, while others may need to be built. Once this has been completed, the next phase will be the actual software work. PDEL anticipates finalizing this phase of the activities near the end of Year 2 of the DIL grant.

1.1.4 Ecosystem for Development Engineering

Several of the activities within DIL are intended to foster a community of "development engineers" – researchers who solve real-world challenges by integrating insights from development economics (and other social sciences) with advances in science and engineering. The activities supported by DIL include training, new publication outlets, and seminars, as well as incentives and mentoring to facilitate the translation and scale-up of new technologies.

ACADEMIC JOURNAL

To foster academic recognition for young faculty members engaging in high-impact development innovation, DIL has been working to launch a new peer-reviewed journal, Development Engineering, for publication of applied research at the cross-section of development economics and engineering. This will reinforce the incentives and rewards for investigators pursuing high-risk, interdisciplinary research. The open access journal will be available through Elsevier, with a proposed launch date in 2015.

DIL IDEA TEAM

The DIL Idea Team is an interdisciplinary group of 10 graduate students selected to help design and implement new, creative ways to engage the UC Berkeley community in global development challenges. In the fall, they hosted an interactive map exercise to help sketch a footprint for development research at UCB; this exercise was held at the first DIL Open House. Additionally, in April, they will host a DIL Innovation Crawl, a campus-wide tour of labs and incubator spaces doing innovative work that is relevant to the field of international development.

POST-DOCTORAL FELLOWS

In the fall of 2013, Dr. Kweku Opoku-Agyemang (development economist) and Dr. S. Imran Ali (environmental engineer) joined DIL as the first two recipients of the *Global Poverty & Practice Post Doctoral Fellows* award. The Postdoctoral Fellows program has two primary objectives:

- To inspire and train the next generation of academic scholars and teachers in global poverty studies and development practice
- To engage post doctoral DIL researchers with USAID's HESN and the broader international development community in finding solutions to global development challenges

During the 2013-14 school year, Drs. Opoku-Agyemang and Ali have contributed to DIL through participation in Big Ideas, the Global Poverty & Practice Minor curriculum at UC Berkeley, and DIL seminars. Fellows are also undertaking their own independent studies. Opoku-Agyemang's research asks whether novel mobile survey platforms can help engage vulnerable citizens in Ghana for participatory public policy. In a collaborative effort with Radio Gold and Ghanaian local officials, he will facilitate, collect, translate and analyze crowd sourced voice messages and SMS discussions on salient citizen concerns such as poverty, health, education, housing, and environmental degradation. Ali's research focuses on safe water and public health in refugee/Internally Displaced Persons (IDP) camps. He is launching observational and intervention studies in multiple refugee camps globally in order to develop evidence-based guidance for emergency safe water supply. He has developed a partnership with the United Nations' Office of the High Commissioner for Refugees (UNHCR) to carry out this research, which is tentatively set to launch this summer in Zaatari refugee camp, Jordan, followed by two further field research phases early next year.


Dr. S. Imran Ali


Dr. Kweku Opoku-Agyemang

Teaching is also a core part of the DIL postdoctoral fellowship. Opoku-Agyemang has been developing a newly designed undergraduate course, "Poverty, Technology, and Development," to be taught in Fall 2014. This course is available to all UC Berkeley students. In Fall 2015, he will teach the Global Poverty and Practice minor (GPP) core course – Ethics, Methods and Pragmatics of Global Practice. In Fall 2014, Ali will teach a core course in the Global Poverty & Practice Minor – Ethics, Methods and Pragmatics of Global Practice.[3] For the Fall Term 2015, he will offer a newly designed undergraduate special topics course, "Approaches to Water, Sanitation, and Hygiene in Emergencies."

Below is a short list of additional UC Berkeley presentations and service completed by DIL's postdocs in the current period:

- Development Engineering Lecture, "Humanitarian Water at Risk: Chlorine Decay in Refugee Camp Water Supply," Dr. Ali, 26 February 2014, Blum Center for Developing Economies, UC Berkeley
- "Humanitarian Water at Risk: Chlorine Decay in Refugee Camp Drinking Water Supply in South Sudan." International Water, Sanitation, and Hygiene Symposium. Dr. Ali, 7 March 7 2014, UC Berkeley.
- Panelist: "Water Everlasting: The Battle to Secure Haiti's Most Essential Resource": Panel Discussion hosted by the Inter-American Development Bank, Dr. Ali, 10 March 2014, Blum Center for Developing Economies, UC Berkeley
- Development Engineering Lecture "Information and Communication Technologies", Dr. Opoku-Agyemang, 12 March 2014, Blum Center for Developing Economies, UC Berkeley
- Facilitator for the Global Poverty and Practice Program's Practice Experience Study Abroad Orientation - Sub-Saharan Africa Break-Out Session, Dr. Opoku-Agyemang, 15 March 2014, Blum Center for Developing Economies, UC Berkeley
- Big Ideas@Berkeley Mentors for the Open Data Category - Open Mapping for Development and Global Poverty Alleviation Category – "Wellness Water Project" (January - March 2014)

BIG IDEAS

In December 2013, the annual Big Ideas@Berkeley contest selected 56 teams for a final round of competition, representing 188 students. These student teams were chosen from among 186 pre-proposals received in November 2014 (which themselves represented nearly 600 students.) BigIdeas finalists each worked with a mentor, from late January through the March 11th deadline, to craft a detailed first-year plan for their "big idea" – setting out the social need being addressed by their idea, along with a project plan, budget, team roster, and timeline. Final proposals are now under review and winners will be announced in late April 2014. Among the 56 finalists are 7 applications from HESN campuses across the three categories: Global Poverty Alleviation, Promoting Human Rights, and Open Data. This includes two from Makerere University, two from Texas A&M University (TAMU), two from William & Mary, and one from Duke University.

In addition, DIL continued to focus on making updates to the Big Ideas Toolkit, developed during the summer of 2013. All pre-proposal and final round applicants were surveyed to better understand the impact the competition has on spurring innovation and skill development among the student population. New resources have been systematically archived and an update for the Toolkit is planned for summer

[3] Each postdoctoral scholar is teaching a similar (but individually tailored version) of this GPP core course (105). The course has the same title (Ethics, Methods, and Pragmatics of Global Practice) but each teacher has autonomy to shape it in a manner which they see most productive given their history and expertise.

2014. The revised Toolkit will incorporate new findings, lessons learned, and an updated appendix of resources.

Finally, DIL has begun discussions with other HESN Labs, most notably AidData (W&M) and the Conflict and Development Center (TAMU), about possible scenarios for continuing our Big Ideas Contest collaboration next year and beyond.

1.1.5. Events

A selection of key events, publications, and communications products for this reporting period are listed in the sections that follow.

First Annual DIL Open House
Thursday, February 6, 2014 - 4:00pm to 6:00pm - Blum Hall, UC Berkeley

In celebration of DIL's one-year anniversary, the Lab hosted an Open House at UCB to connect staff, project partners, and community members for networking and information exchange. The Lab presented updates on activities and initiatives that are seeking to streamline innovation for development at DIL's consortium universities. The event brought together over 150 innovators in the Lab's ecosystem. USAID staff (Tara Hill, Ashley Heiber, and Genevieve Croft) attended the event. As discussed above, the DIL Idea Team (an interdisciplinary group of graduate students) hosted an interactive mapping exercise, with attendees locating brief write-ups of their ongoing research on a massive map.

Revealing the Demand for Pro-Poor Innovation
DIL Annual "State of the Science" Conference
Thursday, March 7, 2014 - 9:00am to 5:00pm – Georgetown University

USAID's Global Development Lab and the HESN continually emphasize the importance of understanding both market demand and consumer needs in low-income countries. This knowledge can improve aid effectiveness and wider adoption of technologies that support poverty alleviation. One of DIL's research thrusts is the design of new approaches and technologies to generate reliable data on low-income consumer demand.

Georgetown University, March 2014

DIL's first Annual State of the Science Conference, "Revealing the Demand for Pro-Poor Innovation," was held at Georgetown University on March 7, 2014. Over 120 engineers, social scientists, funders, practitioners, and policymakers gathered to discuss new approaches that accurately capture the preferences and needs of consumers in low- and middle-income countries. Approximately one third of participants were representatives from USAID. David Ferguson, USAID's Deputy Director, Office of Science and Technology, provided the keynote address for the event.

Additional attendees included HESN collaborators (such as MIT's CITE and MSU's Global Center for Food Systems Innovation), development consultancies such as DAI and Chemonics, and NGOs such as Sanergy and Gram Power. To build awareness and drive attendance at the event, David Ferguson also published a blog post on the importance of understanding consumers, on NextBillion.net.

All of the products of the event, including the agenda, conference white paper, videos of presenters, and slide decks from all presentations, as well as various conference-related links, have been posted on the USAID Learning Lab Website.

Dev Eng Seminar Series (Spring 2014)

The Development Engineering Lecture Series explores and examines innovation in the sustainable development of agriculture, public health, education, and engineering in emerging regions. All Seminars were held in B100 Blum Hall from 4pm - 5pm. The Series was funded by the Institute for International Studies at UC Berkeley, through support of the working group on Behavioral Sensing.

Seminar Date	Speaker
February 5	Mobile Data Collection, Aggregation, and Dissemination Gaetano Borriello, Professor Computer Science and Engineering, University of Washington
February 12	Mobile Micropscopy for the Masses Dan Fletcher, Chair in Engineering Biological Systems Department of Bioengineering, UC Berkeley
February 19	Design for Change Lab: Transdisciplinary Processes to Bring About Rapid Change and Large-Scale Impact Banny Banerjee, Director of the Stanford Change Lab
February 26	Water and Sanitation in Emergency Contexts Imran Ali, DIL Postdoc Fellow, UC Berkeley
March 5	Faculty Panel Discussion Clair Brown, Professor, Department of Economics, UC Berkeley John Canny, Professor, Computer Science, UC Berkeley Ken Goldberg, Professor, Computer Science, UC Berkeley David Levine, Professor, Haas School of Business, UC Berkeley
March 12	Information and Communication Technologies Tapan Parikh, Assistant Professor, School of Information Kweku Opoku-Agyemang, DIL postdoc Fellow
March 19	Faculty Panel Discussion – Clean Water Initiatives Clair Brown, Professor, Department of Economics, UC Berkeley Alice Agogino, Professor, Mechanical Engineering, UC Berkeley Kara Nelson, Professor, Civil and Environmental Engineering, UC Berkeley Susan Amrose, Researcher, Environmental Energy Technologies Division, LBNL
April 2	Mobile Data Collection, Aggregation, and Dissemination Joshua Blumenstock, Assistant Professor School of Information, University of Washington
April 9	Public Health and Sanitation Jaspal Sandhu, Associate Professor School of Public Health, UC Berkeley

April 16	Sustainable Design: Global Engineering and Research Lab Amos Winter, Assistant Professor of Mechanical Engineering Massachusetts Institute of Technology
April 23	Low Cost, Low Emissions Biomass Cookstoves for the Masses Ashok Gadgil, Division Director and Faculty Senior Scientist Environmental Energy Technologies Division, LBNL

In addition to events hosted by DIL, the Lab's staff and partners participated in several other conferences, as outlined below.

American Association for the Advancement of Science
Annual Meeting 2014 - February 13-17, Chicago, IL

Lina Nilsson, Director for Innovation at the Blum Center, represented DIL at the American Association for the Advancement of Science's Annual Meeting in Chicago. She spoke on a panel on "Grand Challenges: Science and Technology Solutions for International Development," moderated by Alex Dehgan from USAID. The goal of the session was to expose participants to new innovation models for development, leading to a larger scientific community working to solve development challenges. Other panelists on this discussion included Peter Singer (Canadian Academy of Health Sciences), Steve Buchsbaum (Bill & Melinda Gates Foundation), Wendy Taylor (USAID), and Paul Bunje (X Prize Foundation).

National Collegiate Investors and Innovators Alliance (NCIIA) Annual Conference
March 21-22, 2014, San Jose, CA

DIL sponsored a presentation at this year's NCIIA Conference on "USAID and Universities: Catalyzing novel solutions to development challenges." The presentation featured USAID Senior Advisor and HESN Program Director Ticora Jones. Details are online at http://nciia.org/open/presentation/usaid-and-universities-catalyzing-novel-solutions-to-development-challenges/. In addition, Carson Christiano, Evaluation Coordinator at DIL and Partnerships Manager at CEGA, spoke on a panel on Failure-Hindsight. A clip of her remarks is online: https://www.youtube.com/watch?v=wWSHOFtqoXU.

1.1.6. Publications

A list of publications related to DIL-funded projects includes the following.

- Amrose, S., Bandaru, S., Delaire, C., van Genuchten, C., Dutta, A., DebSarkar, A., Orr, C., Roy, J., Das, A., Gadgil, A. "Electro-chemical Arsenic Remediation: Field Trials in West Bengal," Science of The Total Environment. December 2013.
- Amrose, S., Gadgil, A., Srinivasan, V., Banaru, S., Delaire, C., Van Genuchten, C., Dutta, A., DebSarkar, A., Orr, C., Roy, J., Das, A., Li, L., "Old Solutions to New Problems?" Environment. October 2013.
- Delaire, C., Van Genuchten, C., Amrose, S., Gadgil, A., "Concurrent Arsenic and Microbe Removal from Groundwater Using Iron Electro-Coagulation: Mechanisms of E.coli Attenuation," American Geophysical Union, Fall Meeting 2013. December 2013.
- Hasan, S., Heimerl, K., Harrison, K., Ali, K., Roberts, S., Sahai, A., Brewer, E., "GSM Whitespaces: An Opportunity for Rural Cellular Service," December 8, 2013.

- Heimerl, K. Hasan, S., Ali, K., Parkih, T., Brewer, E., "An Experiment in Reducing Cellular Base Station Power Draw with Virtual Coverage," Proceedings of the 4th Annual Symposium on Computing for Development, Article No. 6. December 2013.
- Heimerl, K. Hasan, S., Ali, K., Parkih, T., Brewer, E., "Local, Sustainable, Small-Scale Cellular Networks," Proceedings of the Sixth International Conference on Information and Communication Technologies and Development. Volume1. December 2013.
- Preble, C., Hadley, O., Gadgil, A., Kirchstetter, T.. "Emissions and Climate-Relevant Optical Properties of Pollutants Emitted from a Three-Stone Fire and the Berkeley-Darfur Stove Tested Under Laboratory Conditions," Environmental Science & Technology. March 2014.
- Thomas, E.,"Im/Proving Global Impact: Feedback on Program Outcomes," The Freshwater Trust, December 2013.
- Thomas, E., "(Im)Proving Global Impact: How the Integration of remotely reporting sensors in water projects may demonstrate and enhance positive change," UNESCO Global Water Forum, December 1, 2013.
- Thomas, E., Mattson, K., "Counting Heads," DEMAND: ASME Global Development Review, 2013. Link: ASME_GDR_CaseStudy1_P4.pdf
- Thomas, E., Barstow, C., Rosa, G., Majorin, F., Clasen, T., "Use of Remotely Reporting Electronic Sensors for Assessing Use of Water Filters and Cookstoves in Rwanda,"
- Van Genuchten, C., Peña, J., Amrose, S., Gadgil, A., "Structure of Fe (III) Precipitates Genreated by Electrolytic Dissolution of Fe (0) in the Presence of Groundwater Ions," Geochimica et Cosmochimica Act Volume 127, 15. February 2014.

1.1.7. Communications

Cultivating the ecosystem for development innovation requires building social networks, fostering new institutions, and establishing productive partnerships. Toward this end, DIL has developed a robust communications and outreach strategy, including newsletters, web, and a social media presence.

MEDIA COVERAGE

DIL funded projects have received attention on various blogs and media outlets:

- "How Remote Places Can Get Cellular Coverage by Doing It Themselves," MIT Technology Review (December 11, 2013)
- "Strengthening the Sanergy Movement - UC Berkeley," Sanergy (January 23, 2014)
- "Cellular's open source future is latched to tallest tree in the village", ARS Technica (February 27, 2014)
- "Indian Company Licenses Berkeley Lab Invention for Arsenic-free Water," Lawrence Berkeley National Laboratory NewsCenter (March 5, 2014)
- "Arsenic-free water – aided by Bay Area team's technology," San Francisco Chronicle (March 9, 2014)
- "Opportunities for Improving Panama's Potable Water," UC Berkeley Center for Latin American Studies (March 20, 2014)
- "Berkeley Lab's Ashok Gadgil Develops Arsenic-Free Water Technology," India West (April 3, 2014)

SOCIAL MEDIA AND NEWSLETTERS

DIL's social media presence aims to expand the Lab's network while also promoting partners. The DIL Twitter feed (@DevImpactLab) now reaches 440+ followers and continues to grow. The account provides the Lab with the opportunity to highlight other projects and partners, including other HESN Labs. Consistent and uniform hashtags are used for all tweets (#Tech4Dev, #deveng, #HESN). Additionally, for the first annual State of the Science Conference on "Revealing Demand for Pro-Poor Innovations," the hashtag #DIL2014 was utilized to generate online discussion throughout the event. This has been particularly useful to track and archive the discussions during the conference.

DIL continues to publish its biweekly DIL Connect e-newsletters for the Berkeley campus community. There are over 400 people subscribed; the newsletter is used to announce programs or activities, grant opportunities, and competitions. It also is a tool to let update the consortium about opportunities available through other HESN labs.

DIL STATE OF THE LAB

At the end of 2013, a *State of the Lab* magazine was published, highlighting some of DIL's innovators, initiatives, and findings from the prior year.

DIL has continued to highlight our programs with individual State of the Lab articles:

- Postdoctoral Fellows Program
- Development Engineering Seminars Explore Technology-Based Solutions to Poverty
- Development Impact Lab Explores Consumer Demand for Pro-Poor Innovations at Inaugural Conference

The magazine allows DIL to reach a broader audience and to further enrich the Dev Eng ecosystem. All articles and press releases are published on online at http://dil.berkeley.edu/news-events/news/

DIL State of the Science conference, 2014

1.1.8. Travel

The following international travel using full or partial HESN funding occurred in the reporting period:

Location	# of ppl	Partner(s) Engaged	USAID Engaged	Outcome(s) & Next Steps
Mumbai, India	1	IIM Ahmedabad, TERI University	India mission	Advanced collaboration with USAID India Mission
Cape Town, South Africa	5	Atiri Clinic	N/A	Interviewed potential users of frugal disinfection technology to determine clinical resources and practical requirements for technology adoption. Attended Conference on ICTD and ACM's Annual Symposium on Computing for Development (DEV-4) to present and discuss two specific sub-components of VBTS project, held meetings with collaborators and potential partners for the Mezuri project, and sought input on the toolkit's feature set and architecture.
Kampala, Uganda	2	UCSD, Grameen Foundation, IPA	N/A	Completed initial planning of research design, conducted randomization, and piloted surveys.
Dhaka, Bangladesh	1	SNV World	N/A	Exploratory research and advanced collaboration re: Fecal Sludge Reuse
Ho Chi Minh City, Vietnam	3	Energy Conservation Research and Development Center	N/A	Initiated microgrid research and collaborated with local project partners
Long Xugyen, Vietnam	3	Energy Conservation Research and Development Center	N/A	Initiated microgrid research and collaborated with local project partners
Nairobi, Kenya	2	Sanergy, Ltd.	N/A	Met with stakeholders, tested self-disinfecting toilet prototypes, researched busines resources, and developed business model
Bangkok, Thailand	1	Energy research Institute, Chulalongkorn Univ.	N/A	Exploratory research re: Solar PV Roadmap Process
Panama City, Panama	4	Global Brigades	N/A	Advanced collaboration of ongoing project.
Hyderabad, India	1	Nalgonda District	N/A	Created a network of connections to educational institutions and government officials for future field pilot studies, collected quantitative and qualitative data on water quality and levels of endemic fluorosis, and researched potential for scale-up.
San Francisco, USA (from Mumbai)	1	IIT Bombay	N/A	Advanced collaboration between IIT Bombay and Berkeley re: voltage monitoring on national grids.
Nairobi, Kenya	2	Innovations for Poverty Action, REA	Power Africa, Kenya mission	Implementation of REPP research by PhD students in computer science and economics (UCB).
Washington, DC (from Nairobi)	2	Sanergy, Flashcast	HESN	Attendance at Revealing Demand Conference
Berkeley, CA (from Kolkata)	2	Jadavpur University, IIT – Kharagpur	N/A	Advanced collaboration with visiting scholars in association with DIL Demonstration projects

Part 2: Intra-Development Lab/ University Engagement

2.1. Interdisciplinary Collaboration

DESIGNATED EMPHASIS IN DEVELOPMENT ENGINEERING

The Designated Emphasis in Development Engineering (Dev Eng), being piloted at UCB, is a degree program to foster intellectual community and provide research and professional support for doctoral students engaged in pro-poor innovation. This emphasis, akin to a "minor," is a concentration for PhD students in quantitative disciplines. It has been designed through a multi-year, collective faculty and staff planning process. The program has four main components:

- Two newly-developed required courses that introduce interdisciplinary technology design and evaluation methods, plus novel approaches for electronic field data collection and analysis
- A set of elective courses clustered into thematic modules, to ensure the development of depth of knowledge
- Independent, mentored research including participation in international field research and collaboration with foreign researchers
- Seminars, workshops, and conferences for presentation of ongoing research, and to engage an interdisciplinary community of faculty and graduate students in discussion of how the field is developing and changing. These community activities will foster interdisciplinary intellectual growth and professional development.

DIL is providing start-up funds for the Dev Eng emphasis, in the form of staffing support. The Lab has also provided support to faculty members and graduate students involved in the curriculum design process.

DEV ENG CURRICULUM

The foundation for the Dev Eng program lies in two required courses to be co-taught by faculty in two different departments: one from a technology discipline, the other from economics or business. The two core courses are:

(1) *Development Technologies: Design and Evaluation*. This introductory core course will draw on case studies related to DIL's portfolio of demonstration projects. Each case study will include assignments requiring students to collect and analyze data to define the development problem being addressed. Students will also begin to design solutions, and collect and analyze interview and survey data from potential users. Where feasible, data collection will leverage DIL's evaluation toolkit, including the Mezuri platform. Student teams will eventually develop prototypes with serial improvements based on user feedback and data analysis. As part of the course, students also will be asked to develop a plan for scaling and evaluation with a rigorous controlled trial. This one-semester overview course, offered in the fall semester, will be initially co-listed in Engineering and Business (the schools with faculty teaching the course the first two years). Master's students from these and other units will be permitted to take the core course as space permits and with permission of an instructor.

The four course modules include:

- Problem Identification and Design (human-centered design focus with participant observations and interviews using qualitative research plus survey data collection based upon design of alternative prototypes)
- Design of Development Technologies (including case studies on the design of low cost energy, health and clean water technologies; analysis of existing data sets to identify potential energy, environment, and market constraints that inform prototype development)
- Measurement and evaluation techniques (including design of lab and field experiments, statistical analysis for impact analysis, large data analytics, controlled trials); methodologies for collection and evaluation of data for iterative redesign of innovations (sensors, mobile data, meters)
- Developing, evaluating and scaling social impact (including sustainability and scaling of projects); going beyond rigorous trials to look at broader impact on people and communities.

(2) Dev Eng Research and Practice Seminar. This seminar, to be offered in alternate terms, will focus on work-in-progress presentations by students enrolled in the designated emphasis, as well as faculty and guest lecturers. Students are required to take at least one semester of the seminar.

The faculty members co-teaching the required *Research and Practice Seminar* will be the faculty advisors for enrolled graduate students. This includes faculty from a broad range of disciplines who have agreed to be part of the Dev Eng faculty group.

In addition to core requirements, Dev Eng students must take three additional elective courses from at least two thematic modules, to focus and deepen students' training in a relevant field. Below is a list of selected elective courses organized within the three modules:

(1) Problem Identification and Design (with participant feedback)
- Civil & Environmental Engineering 209: Design for Sustainable Communities (Instructor: Ashok Gadgil, Susan Amrose)
- Development Practice 225: Innovation, Marketing, and Entrepreneurship (Instructor: Sophia Villas-Boas)
- Development Practice 228: Strategic Planning and Project Management (Instructor: Celeste Roschuni)
- Development Practice 232: Foundations of Public Health (Instructor: Art Reingold)
- Economics 219B: Applications of Psychology and Economics (Instructor: Stefano Dellavigna)
- Information 213. User Interface Design and Development (Instructor: Tapan Parikh, Marti Hearst)
- Information 214. Needs and Usability Assessment (Instructor: Elizabeth Goodman, Nancy Van House, Maggie Law)
- Information C283: Information and Communications Technologies for Development (Instructor: Jennifer Burrell, Isha Ray)
- Information 272: Qualitative Research Methods for Information Systems and Management (Instructor: Jennifer Burrell)
- Information 287: Information and Communications Technologies for Social Enterprise (Instructor Tapan Parikh)
- Mechanical Engineering 290H: Green Product Development – Design for Sustainability (Instructor: Alice Agogino)

- Mechanical Engineering 290P: New Product Development – Design Theory and Methods (Instructor: Alice Agogino)
- Public Health 290: Designing Innovative Pubic Health Solutions (Instructor: Jaspal Sandhu)
- Haas MBA 215.1: Business Strategies for Emerging Markets (Instructor: David Levine)

(2) Evaluation Techniques and Methods for Measuring Social Impact
- Economics 274: Global Poverty and Impact Evaluation (Instructor: Edward Miguel, Edward Miguel, Fred Finan)
- Economics 240A/B: Econometrics
- Economics 270A/B: Microeconomics of Development
- Haas MBA 292: Social Sector Solutions (Instructor: Nora Silver)
- MBA 296: Applied Impact Evaluation – How to Learn What Works to Lower Global Poverty (Instructor: Paul Gertler)
- Public Health 252C: Intervention Trial Design (Instructor: Jack Colford)
- Agricultural and Resource Economics 253: International Economic Development Policy (Instructor: Alain de Janvry)

(3) Development Technologies (Appropriate Technologies, Sensors, Data Collection, Data Mining and Analysis)
- Bioengineering 168L: Practical Light Microscopy (Instructor: Dan Fletcher)
- Civil & Environmental Engineering 290: Advanced Special Topics - Control Market and Privacy Tools for Participatory Sensing (Instructor: Alexandre Bayen)
- Civil & Environmental Engineering 210: Control of Water-Related Pathogens (Instructor: Kara Nelson)
- Civil & Environmental Engineering 271: Sensors and Signal Interpretation (Instructor Steven Glaser)
- Information 271B. Quantitative Research Methods for Information Systems and Management (Instructor: Coye Cheshire)
- Computer Science 289A: Introduction to Machine Learning (Instructor: Jitendra Malik)
- Computer Science 294-1 Behavioral Data Mining (Instructor: John Canny)
- Economics 291/Engineering 298B: Behavior Measurement and Change (Instructor: Shachar Kariv, Raja Sengupta)

APPROVAL PROCESS

In March 2014, DIL received UCB Graduate Council approval for the proposal to launch a Designated Emphasis in Dev Eng. With administrative approval secured, the next step will be to obtain Academic Senate approval for the two core courses in the emphasis. The aim is for Berkeley's Committee on Courses of Instruction (COCI) to review the proposed courses by April 2014.

Assuming timely course approvals, the Dev Eng program will be available in Fall 2014. The Dev Eng program will be administered by the Blum Center with an academic home in the Department of Civil & Environmental Engineering. The emphasis is deeply interdisciplinary in its design. This is expressed through the range of departments affiliated with the program; the range of faculty constituting the governing body ("Graduate Group"), the content of the core and elective courses, and the broad administrative support (represented, below, in the range of program support letters received for the proposal).

Dev Eng will draw doctoral students from multiple disciplines and colleges, including: College of Engineering (e.g., Computer Science and Electrical Engineering, Mechanical Engineering, Civil and Environmental Engineering, Bioengineering); College of Letters and Science (e.g., Economics, Political Science, Statistics, Physical Sciences, Mathematics); Haas School of Business; Economics; School of Information; College of Natural Resources (e.g., Agricultural and Resource Economics; Environmental Science, Policy and Management); School of Public Health; Energy and Resources Group; Graduate School of Education; and College of Environmental Design (e.g., City and Regional Planning, Architecture). Many of these academic units are already participating in DIL seminars and programs.

The following Deans, Department Chairs, and Administrators submitted letters of support on behalf of the establishment of this program.

- David Culler (Chair, Electrical Engineering and Computer Science)
- David Dornfeld (Chair, Department of Mechanical Engineering)
- Kevin Healy (Chair, Department of Bioengineering)
- Richard Lyons (Dean of the Haas School of Business)
- Samer Madanat (Chair, Civil and Environmental Engineering)
- Temina Madon (Executive Director of CEGA, Managing Director DIL)
- James Powell (Chair, Department of Economics)
- Shankar Sastry (Dean, College of Engineering; Faculty Director, Blum Center)
- AnnaLee Saxenian (Dean, School of Information)
- David Sunding (Chair of Agricultural and Resource Economics, College of Natural Resources)
- Paul Waddell (Chair of City and Regional Planning, College of Environmental Design)

Faculty members participating in the program also come from a range of disciplines:

- Alice Agogino (Mechanical Engineering) *Chair of Dev Eng / Executive Committee Member*
- Eric Brewer (Computer Science / EECS) *Executive Committee Member*
- Clair Brown (Economics) *Executive Committee Member / Co-Graduate Advisor*
- Jenna Burrell (School of Information)
- John Canny (Computer Science / EECS)
- Jack Colford (Public Health)
- Dan Fletcher (Bioengineering) *Co-Graduate Advisor*
- Ashok Gadgil (Civil and Environmental Engineering) *Executive Committee Member*
- Paul Gertler (Haas)
- David Levine (Haas) *Executive Committee Member*
- Kara Nelson (Civil and Environmental Engineering)
- Tapan Parikh (School of Information) *Co-Graduate Advisor*
- Ananya Roy (City and Regional Planning / Global Poverty and Practice)
- Elisabeth Sadoulet (Agricultural and Resource Economics, College of Natural Resources)
- Shankar Sastry (Dean, College of Engineering / Director, Blum Center)
- Laura Tyson (Hass)
- Catherine Wolfram (Haas)
- David Zilberman (Agricultural and Resource Economics, College of Natural Resources)

2.2. Partner Engagement

INTER-AMERICAN DEVELOPMENT BANK

From November 21 – November 22, 2013, the Inter-American Development Bank joined together with USAID and the UCB Blum Center for Developing Economies to co-host "Demand Solutions: Ideas for Improving Quality of Life." This two-day event in Washington, D.C. brought together some of the world's most creative minds in development to discuss and share innovative solutions for addressing development issues in Latin America and the Caribbean (LAC). The Blum Center, along with the Center for Effective Global Action, serves as one of two implementing partners for DIL.

The event was attended by Shankar Sastry, DIL's Chief Scientist and Heather Lofthouse, DIL's Associate Director of Partnerships. Additionally, three leading researchers from DIL's portfolio of demonstration projects presented work at the event. Laura Stachel, Co-Founder of We Care Solar, presented on "A Solar Suitcase that Saves Lives." Ken Goldberg of CAFÉ served on a panel titled, "Digital + Democracy + Human Rights: How can technology transform governance and democracy in developing countries?" Dan Fletcher, the faculty lead for CellScope, also served on a panel titled, "How do you bottle the innovation process to generate ideas that are sustainable and deliver development impact?" Demand Solutions presented a unique opportunity for DIL-funded researchers to present their work to a broader audience, with a focus on adoption and scale-up in LAC.

HESN and USAID representatives at the event included Administrator Raj Shah and Marissa Leffler, Senior strategy and innovation advisor. Additionally, Amy Smith who heads MIT's International Development Innovation Network (IDIN) served on a panel titled, "Entrepreneurship: From Ideas to Solutions." Other distinguished attendees of this event included Peter A. Singer who serves as CEO Grand Challenges Canada.

The following additional partners in the DIL consortium were engaged October 2013 – March 2014:

Partner	Partner Type	Location (City and Country)	Outcome(s)
IDEO.org	Unfunded	San Francisco, USA	Engaged in curriculum development for Dev Eng
BRAC	Unfunded	Dhaka, Bangladesh	Discussed potential research partnerships for DIL competitions
MSR India	Unfunded	Bangalore, India	Discussed potential research partnerships and student internship opportunities

Among other mechanisms, DIL uses two new programs at UCB, the Practitioner in Residence series and DIL Salons, to engage new potential collaborators with the ability and interest to mentor the Lab's faculty, students, and other grantees. These potential collaborators have varied across sector and regional expertise.

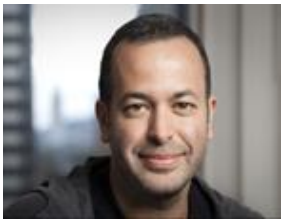
DIL SALONS

DIL Salons are in-depth, small-group conversations led by leaders across the technology and development fields. Each one-hour Salon focuses on a broad implementation theme, such as field-testing, international collaborations or regulatory approvals. DIL Salons are held once a month.

October 2013: David Green, MacArthur/Ashoka Fellow
Topic: How to Distribute Risk during the Path of Least Resistance to Commercialization
David is MacArthur Fellow, an Ashoka Fellow and has been recognized by Schwab Foundation as a leading social entrepreneur. David is also Vice President at Ashoka, where he leads an effort to reduce health care costs in the U.S. David has worked with many organizations to make medical technology and health care services sustainable, affordable and accessible to all. David directed the establishment of Aurolab (India), to produce affordable intraocular lenses (which now has 10% of the global market share), sutures and pharmaceuticals. He has developed high-volume, quality eye care programs that are affordable to the poor and self-sustaining from user fees, including Aravind Eye Hospital in India - which performs over 360,000 surgeries per year.

November 2013: Dr. Sheila Desai, Senior Science and Technology Advisor, USAID India
Topic: Scaling-Up Technologies for Development: Leapfrogging the Status Quo
Dr. Sheila Desai is the Senior Science and Technology Advisor for the USAID India Mission's Center for Innovation and Partnerships. Previously she served as the Deputy Director for the Office of Food Security within the USAID/India Mission. She regularly coordinates with USAID Washington DC initiatives to increase cooperation between U.S. Universities and visiting U.S. scholars/scientists with Indian organizations.

January 2014: Jonathan Berman, Writer, Speaker, and Global Development Consultant
Topic: Starting New Ventures in Africa: Entry, Strategy, and Political & Cultural Engagement
Jonathan Berman is an author, speaker, and consultant. He current serves as a senior fellow at Columbia University's Vale Center and a senior advisor to Dalberg, a strategic advisory firm focused on frontier markets. He has advised numerous global Fortune 500 companies on entry and operations in emerging and frontier markets, focusing on the political and economic dynamics that drive shareholder value.



February 2014: Nathan Wolfe, Founder & CEO of Metabiota, and Founder of Global Viral
Topic: Leveraging Microbiology for Global Change
Dr. Nathan Wolfe, the Lorry I. Lokey Visiting Professor in Human Biology at Stanford University, has spent his life studying deadly viruses to detect worldwide disease pandemics before they kill millions. Wolfe is Founder and CEO of Metabiota, a for-profit company specializing in microbiological research, products and services. He is also Founder and Executive Chairman of Global Viral, a non-profit promoting understanding, exploration and stewardship of the microbial world.

PRACTITIONERS IN RESIDENCE

The Practitioners in Residence program connects on-campus innovators and social entrepreneurs at UCB with experts from industry, non-profits, government, and social enterprises for one-on-one consultation and mentorship.

October 2013: Elliot Anderson, CEO, Sanku Fortification.
Elliot currently serves as CEO of Sanku Fortification, a for- profit social enterprise working to reduce hidden hunger in the developing world. As a consultant with the Monitor Group, he has also served as an advisor, strategist, and consultant to multiple foreign governments and NGOs on economic development initiatives - including USAID, the World Bank, IFC, and foreign Ministries in El Salvador, the Dominican Republic, and Brazil.

November 2013: Dr. Sheila Desai, Senior Science and Technology Advisor, USAID India
Dr. Sheila Desai is the Senior Science and Technology Advisor for the USAID India Mission's Center for Innovation and Partnerships. Previously she served as the Deputy Director for the Office of Food Security within the USAID/India Mission. She regularly coordinates with USAID Washington, D.C. initiatives to increase cooperation between U.S. universities and visiting U.S. scholars/scientists with Indian organizations.

November 2013: Jane Coyne, Director of Operations, WE CARE Solar
Jane Coyne is the Director of Operations at We Care Solar, a BigIdeas@Berkeley finalist that today promotes safe childbirth in over two dozen developing countries. We Care Solar equips off-grid medical clinics with solar power for surgical lighting and essential medical devices. Prior to this, Jane worked for nearly a decade in management and logistics of humanitarian aid.

February 2014: Roger Chen, Investor, O'Reilly AlphaTech Ventures
Roger Chen is a Berkeley-trained engineer who is now an investor at O'Reilly AlphaTech Ventures (OATV), where he looks for collisions between the unmet needs and enabling technologies in underserved spaces. OATV is in the business of funding disruptors, innovators, and hackers of the status quo.

March 2014: Andree Sosler, Access Manager for Developing Economies, Medicines360
Andree has over a decade of experience in poverty alleviation and economic development and has worked in more than a dozen countries. During her time at Potential Energy, she grew the Darfur Stoves Project into an independent nonprofit organization with funding from donors such as USAID and the Global Alliance for Clean Cookstoves. She earned an MBA from The Wharton School, and an AB in Development Studies from Brown University.

Part 3: High Value Areas of Collaboration [HVAC] (Lab-to-Lab)

3.1. Summary of Collaboration Across the HESN

DIL engages with fellow Development Labs through multiple outlets, including the Big Ideas student competition, and supports its partner universities through specific DIL demonstration projects.

3.1.1. Data

OPEN DATA "BIG IDEAS"

In collaboration with AidData at William & Mary, Big Ideas@Berkeley added a new category on "Open Data" to the portfolio of contests currently offered. Staff from both Big Ideas and AidData worked together to frame the scope of the contest, develop marketing materials and a draft a contest description. The category, cosponsored and jointly funded by DIL, the Blum Center, and AidData[4], challenged students to develop a plan that leverages publicly available datasets to design innovative solutions to social challenges. Along with two other Big Ideas Categories (Global Poverty Alleviation, Promoting Human Rights), Open Data was opened up to all students from the 7 HESN partner campuses.

As part of this collaboration with William & Mary and other partnering campuses, Big Ideas @ Berkeley organized several opportunities for students to learn about the contest and improve their grant writing skills. Multiple information sessions, plus writing and budgeting workshops, were available via live webcast, with students from all HESN campuses invited to participate. These sessions were also recorded and are available online at http://bigideas.berkeley.edu/resources/workshop/. In addition, the Big Ideas staff held campus-to-campus remote information sessions (via Skype and Google Hangout+) for students at Makerere University, William & Mary and TAMU. An "on-air" Google Hangout for students from partnering HESN campuses was coordinated by William & Mary and UCB to provide more information about the Big Ideas Contest and the Open Data category in particular. This live webcast featured representatives from the AidData program as well as the CITRIS Data Democracy Initiative at UCB, highlighting some of the innovative applications and trends in open data.

In November this category received 25 pre-proposal applications, nearly half of which came from student teams at other HESN campuses (not including UCB). After a review period, six teams were selected to compete as finalists in the Open Data category, including three from other HESN campuses. The Big Ideas Contest winners will be announced in early May 2014.

[4] AidData provided $15,000 in support of the 2013-2014 Big Ideas competition.

Table 3.1.1 HVAC Data

Partner	Completed / Ongoing Activity	Outcome(s)
Makerere	Ongoing Activity: Collaborated on Big Ideas competition	8 pre-proposals received and 1 pre-proposal from Makerere as finalist for the Open Data competition.
William & Mary	Completed Activity: Collaborated on Big Ideas competition	Initiated new Big Data category open to all 7 HESN Lab applicants, hosted collaborative workshops and info sessions for applicants. Received 2 pre-proposals and 1 finalist for competition.
Duke	Ongoing Activity: Collaborated on Big Ideas competition	2 pre-proposals received and 1 finalist for competition.
TAMU	Ongoing Activity: Collaborated on Big Ideas competition	2 pre-proposals received.

3.1.2. Solutions (Creation, Testing, Scaling)

Uncovering potential solutions to development challenges has been a strong focus for DIL's partnership with its consortium universities, which include UW, PSU, IIT-Bombay, Jadavpur University, and Makerere University. New solutions within the consortium network have been sought out and sourced through the Lab's Innovate and Explore competitions. Ongoing participation and key contributions by partner universities are highlighted in Table 3.1.2. These do not include solutions being tested at campuses within the University of California, where DIL is headquartered.

Table 3.1.2 HVAC Solutions (Creation, Testing, Scaling)

Partner	Completed / Ongoing Activity	Outcome(s)
IIT- Bombay	Ongoing Activity: DIL Explore Project (Chicken Rearing: Heating and Cooling Techniques for Small Poultries)	The team is conducting an exploratory research study on small and medium poultry farms and the efficacy of different heating and cooling practices and ambient conditions on poultry production in India.
	Completed Activity: DIL Explore Project (Voltage Monitoring in Rural Areas)	The Team designed, prototyped, and deployed a low-cost voltage monitoring device to monitor voltage and harmonic content of grid supply. The team studied the effectiveness of the device in five initial locations in preparation of scaling the system across a few districts.
Jadavpur University	Ongoing Activity: DIL Explore Project with ties to Demonstration project number 5 (Electrochemical Arsenic Remediation - ECAR)	This team conducted a study of social drivers for and barriers to purchase and consumption of safe water in a targeted community in West Bengal. Based on data collected, the project team will generate a hypotheses needed to design an appropriate business model and behavior change intervention to support the distribution of safe water from ECAR.
	Ongoing Activity: DIL Innovate Pilot Project with ties to Demonstration project number 5 (Sustainable Arsenic-Bearing Sludge Management)	The project will explore a safe and sustainable disposal method for the arsenic-laden sludge. The team will embed arsenic bearing ECAR sludge in variable proportions in concrete, sand-cement mortar, brick and rigid pavement followed by measurement of arsenic and other toxic constituents.

University of Washington	Ongoing Activity: DIL Innovate Full project (High Resolution Development Indicators)	The project will develop innovative methods for estimating a range of development indicators continuously across time and space, by combining traditional face-to-face and phone-based surveys with "big data" from other sources. These techniques will be deployed and calibrated in Afghanistan, a uniquely challenging "real world" context that is a priority focus of US and international policymakers.
PSU	Ongoing Activity: DIL Innovate pilot project (Sensor Reactivity Study)	In the context of improving the reporting of intervention uptake and program impact in international development, this project will conduct a randomized, controlled trial to study the influence of instrumented monitoring on the adoption of household-level water filters deployed in rural Rwanda.

An additional example of Lab-to-Lab collaboration has been joint support of We Care Solar (a DIL demonstration project), which is mentored by the Duke HESN center. Both Labs have provided advising and funding for WCS researchers as they advance from prototype to scale.

3.1.3. Student Engagement

BIG IDEAS

The 2013-2014 Big Ideas@Berkeley contest launched in November 2013 when 187 teams representing 600 students from 75 majors submitted pre-proposals. After a preliminary review, 56 teams of finalists were invited to submit full proposals to compete in the final round.

Of the 187 pre-proposals received, 45 were submitted by student teams from HESN partner campuses. After the preliminary review, 7 proposals from HESN partner campuses were invited to compete in the full proposal round.

Big Ideas Category	Makerere	William & Mary	TAMU	Duke
Open Data	8 (1 finalist)	2 (1 finalist)	2	2 (1 finalist)
Global Poverty	7 (1 finalist)	8	6 (2 finalists)	5
Promoting Human Rights	2	2 (1 finalist)	0	1
TOTALS	17 (2 finalists)	12 (2 finalists)	8 (2 finalists)	8 (1 finalist)

In addition to generating significant *student* interest in Big Ideas across HESN, the contest also involved participation from faculty and affiliates from other HESN labs. More than 40 judges and mentors participating in this year's Big Ideas Contest were either a part of HESN, or referred to Big Ideas by USAID.

Table 3.1.3 HVAC Student Engagement

Partner	Preproposal Judges	Final Round Judges	Mentors
USAID	6	1	0
TAMU	6	1	0
W&M	9	2	1
Makerere	7	6	2
TOTALS	28	10	3

Part 4: USAID Engagement

4.1. USAID/Washington Interactions

SOURCING NEW SOLUTIONS

With coordination from USAID's HESN team, DIL faculty and staff liaised with more than 15 USAID bureaus, country missions and regional missions to discuss the viability, relevance, and quality of the Fall 2013 DIL Innovate applications. This provided DIL with an opportunity to communicate its overall goal with a variety of important USAID stakeholders; it also enabled the Lab to obtain important guidance on specific research projects and priorities, from on-the-ground agency staff. In some cases, USAID staff provided concrete feedback that was relayed to DIL research teams and integrated to improve the implementation or scale-up of a project.

UC BERKELEY CAMPUS VISITS

To inaugurate the DIL USAID Fellow program, the Lab hosted Dr. Sheila Desai, Senior Science and Technology Advisor for the USAID India Mission's Center for Innovation and Partnerships, on October 28-December 6, 2013. Sheila hosted a number of events, including:

(1) numerous one-and-one and small-form meetings with the DIL team and many scientists and other innovators from UC Berkeley and beyond;
(2) two sets of office hours for the DIL and UCB innovator ecosystem via the Practitioner in Residence program;
(3) DIL Salon entitled, "Scaling-Up Technologies for Development: Leapfrogging the Status Quo";
(4) a well-attended "Careers and Futures" event open to the entire UC Berkeley community.

In December 2013, DIL hosted Eric King, Innovation Specialist for USAID, for a three-day visit. Dr. King's meetings focused on Berkeley researchers' use of novel measurement techniques and devices (e.g. sensors, mobile, big data, etc.) to help governments, NGOs, and utilities make better decisions about service delivery. He sought insights to better understand data for use in decision-making by USAID, and also held meetings on platform technologies-- including algorithms or devices that could be used in low-income countries. While in Berkeley, he met with DIL researchers and leadership including Prof. Eric Brewer.

From January 6 to 9, DIL hosted Dr. David Roberts, Regional Strategic Advisor, Director's Office, USAID Regional Development Mission for Asia. David participated in 16+ meetings to explore partnership possibilities between DIL and RDMA. DIL also hosted Dr. Teresa Leonardo, Regional Science & Technology Advisor, RDMA on February 4, 2014. Meetings focused on DIL projects with

relevance to urban futures and urban resilience, including a Fall 2013 DIL Innovate project on sustainable roof tiles.

Several members of the HESN team were hosted by DIL in the current reporting period. Tara Hill (Program Specialist), Dr. Genevieve Croft (AAAS Science and Technology Policy Fellow), and Ashley Heiber (Jr. Research and Policy Analyst) performed a site visit from February 5-7, 2014. The team participated in 18+ meetings and represented USAID at the DIL Open House, attended by 100+ members of the UCB Dev Eng ecosystem. The Lab hosted Dr. Ticora Jones, Senior Advisor and Program Director, on March 19 and 21, 2014. Ticora participated in multiple meetings, including speaking at the Dev Eng Seminar, moderating a career discussion titled, "From Weapons Labs to Development Lab: A Discussion on Careers in Science & Tech with Dr. Ticora V. Jones," and presenting at the NCIIA conference in a panel titled, "USAID and Universities: Catalyzing Novel Solutions to Development Challenges," as secured by DIL.

HESN WORKING GROUPS

Two members of the DIL team have been regular participants in the monthly Data and Student Engagement Working Group calls and activities. In addition, two staff members are participants in the M&E Working Group.

STUDENT ENGAGEMENT

DIL is committed to providing opportunities for students to intern with USAID in the international development space. The Lab's staff has coordinated participation of UCB students in two such activities.

USAID Securing Water for Food e-Interns

From October to November 2013, DIL supported USAID in recruiting 5 UCB students to serve as e-Interns for the *Securing Water for Food* Grand Challenge for Development. Grand Challenge Analyst e-Interns reviewed incoming concept notes from water innovators across the world. They were responsible for first-round analysis and scoring of applications, using Grand Challenge's established criteria. The 5 graduate students served as e-interns from January through March 2014. DIL provided $500 in compensation to each student for their time.

USAID Summer Internship

In January 2014, DIL recruited UCB students to apply for HESN's inaugural USAID Summer Internship program. One graduate student (Masters of Public Policy candidate) will serve as an intern in the Global Health Office of Population and Reproductive Health.

4.2. USAID Mission Interactions

POWER AFRICA TEAM

In January 2014, representatives of the Rural Electric Power Project (REPP) met with leaders of the Obama Administration's Power Africa team in Nairobi to discuss how the results of the team's randomized evaluation of grid connection subsidies in Western Kenya may influence Power Africa's rural electrification agenda moving forward. Preliminary census data from REPP suggests that given current grid infrastructure, and current electrification rates in Kenya, roughly 3.3 million new households and small businesses could be brought online simply by connecting them to existing transformers. Throughout the entire REPP project, the DIL team has worked with Energy Access members of USAID's Kenya Mission.

USAID INDIA MISSION

In March 2014, DIL Managing Director Temina Madon and colleagues from CITE (MIT) held a series of meetings wiith the Indian Institute of Management (IIM) in Ahmedabad to explore partnerships in the design of technology-driven development interventions. Discussions with IIM, and the Indian Department of Science and technology, were coordinated by USAID's Science and Technology Advisor, Dr. Sheila Desai. Follow-up is ongoing and will include participation of DIL Director Ashok Gadgil and others in the India-U.S. Technology Summit, to be held in November 2014.

Part 5: Monitoring & Evaluation

5.1. Progress Narrative

DIL is on track to meet its FY 2014 monitoring and evaluation (M&E) targets. The Lab's staff has been actively working to integrate M&E into calls for grant applications, award letters, and onboarding activities for affiliated researchers. This has helped to ensure teams are prepared to report on outcomes and are better versed on the importance of M&E within international development.

In March 2014, with encouragement from the Lab's HESN program advisors, DIL posted a job description for an M&E specialist consultant. The position was widely disseminated, including on idealist.org. DIL received 20 applications for the position and conducted three interviews. An offer is pending acceptance. This new hire will help streamline M&E data gathering and reporting processes across DIL leadership and research teams.

In Spring 2014 DIL also received feedback from several DIL-supported researchers, requesting assistance in understanding and implementing data collection methods for M&E purposes. DIL is therefore planning – and recruiting trainers for – a session on M&E and data quality as of its first "DIL workshops" for Fall 2014.

Part 6: Lessons Learned / Good Practices

DIL is committed to continually evaluating and improving its support for research teams. Among the early lessons learned is an appreciation for analyzing not only the effectiveness of individual programs, but also how the suite of programming serves complementary functions. For example, programs serve in some cases to support existing research teams; while in others, DIL is engaging new teams and the broader ecosystem of problem solvers. Some initiatives provide targeted and customized help to individual projects, while others create open opportunities that can serve large numbers of teams and researchers at once. Attention to this variation in formats, as well as content (skill building versus networking versus mentoring, etc) seems critical for developing an effective and comprehensive support program.

The Lab's staff is also learning to actively seek candid feedback and suggestions from the community of researchers, practitioners, and partners. This is done through formal office hours, bi-annual meetings of grantees, and periodic phone calls with consortium partners. This allows more rapidly, effective evolution of activities. Suggestions received to date range from new event formats and speaker ideas, to workshop topics and networking requests. At the end of each semester (i.e. 4-6 month intervals), the DIL management team reviews its portfolio not only of research team but also its 'portfolio' of support programs. What is working? What can be improved or expanded?

In addition to effective programming, the Lab also prioritizes effective communication of outside research, training, funding, and networking opportunities. The biweekly e-newsletter, State of the Lab updates, and twitter feed all provide avenues to make researchers aware of upcoming events, consulting hours, grant competitions, and conferences hosted by DIL or by the larger development ecosystem, including relevant USAID programs.

Regarding competitions, having implemented multiple rounds of DIL grant-making, the team has a much better sense of how to market and run requests for applications—both on the Berkeley campus, and throughout the consortium. Lessons learned from the first three rounds of DIL Explore and first two rounds of DIL Innovate have been communicated to USAID and were also communicated to other HESN labs at the April 2014 Annual DIL Directors Meeting. Specific topics addressed include:

Conducting Wide Scale Dissemination Campaigns:

- Tailor announcements for different academic audiences (postdocs, graduate students, PIs, etc.)
- Utilize student ambassadors, e.g., the "Idea Team," which empowers students to reach other students
- Leverage partners as spokespersons on their own campuses, as they can be more effective in recruiting their own colleagues

Process and Logistics

- Engage with HESN early for success—whether in the design of competitions, or the launch of new research and development projects
- Be thoughtful about incorporating a gender perspective
- Use online platforms and dedicated email addresses to create a brand for all communications
- Maintain flexibility in management practices and decision-making, and routinely review performance to iterate and improve
- Build buffer time into schedules for competitions, conferences, and other complex activities
- Select grant application reviewers carefully, with thorough vetting, and clearly communicate criteria for evaluation of applications to reviewers and decision-makers
- Consider carefully the privacy and security of research documents, including grant applications, budgets, field data, photographs, and other items containing sensitive information
- Carefully craft communications to sub-grantees, to lay out expectations as clearly as possible—including guidelines for M&E

Keep Ecosystem Top of Mind

- Build and experiment with a variety of support activities when trying to facilitate new research or training initiatives; this can range from workshops and events to peer mentoring and bootcamps.
- Pre-plan for cross-fertilization among teams within the DIL ecosystem– for example through bi-annual scientist meetings, open houses, and other networking activities.

A more technical effort is underway to document lessons learned from DIL demonstration projects, in the form of published case studies. The case studies will evaluate the process of research and solution development, and will also serve as education materials within the Dev Eng designated emphasis. To kickstart this effort, DIL's two postdocs have started to draft case studies investigating:

(1) Rural Electric Power Project (REPP): In this case study, Dr. Opoku-Agyemang and Dr. Ali explore two parallel and integrated projects testing new pathways to expand access to electricity in rural Kenya and India. The study will track how technology and intervention design have adapted to real-world challenges over the course of the research project. In addition, they will explore and the interplay of engineering and economics in the design of clean energy projects.

(2) CellScope: This case study looks at mobile technology for rapid, simplified, and inexpensive diagnostic microscopy of infectious diseases in resource-constrained settings. The case study discusses leveraging existing platforms to create new technology solutions; as well as the types and importance of effective on-the-ground partnerships, and the centrality of iterative design with end-users, and different pathways for scaling technologies.

These case studies will be completed in late May 2014. The postdocs have drawn invaluable feedback and lessons learned from ongoing communication and feedback loops with project scientists.

Moving forward, DIL will be working to create more avenues of information sharing so that project teams can more easily share lessons learned, key achievements, as well as challenges associated with their work. Knowledge sharing will be facilitated with collection and sharing of brief project updates as well as continuation of biannual project scientist retreats.

Part 7: Future Activities

7.1 Portfolio of Demonstration Projects

DIL's portfolio of demonstration projects will continue to evolve in the coming months. All solutions under development will continue to push toward measurable impact, and they will continue to articulate the Dev Eng approach. Specific future activities of individual projects may be found below.

Rural Electrification Pilot Project (REPP): The India team has prepared surveys, protocols, scripts, and software for the purposes of site selection. Next steps in Kenya include the design of subsidies to improve adoption of energy-efficient appliances.

CellScope: The team continues to refine the video processing algorithm to extend its dynamic range and sensitivity.

Village Base Station (VBTS): The team has built a complete prototype GSM whitespace base station and is testing recently manufactured RAD1 radios. The team is currently in the field site selection process for this improved technology.

We Care Solar: In Uganda, new trainees have a goal of equipping over 100 health facilities with Solar Suitcases for maternity care lighting, phone charging, and computer charging. In Malawi, WCS is partnering with Jhpiego to bring 40 Solar Suitcases to maternal health facilities. In Tanzania, a new program with partners at Tanz Solar and the Tanzania Rural Electric Agency is in planning phase. WCS has identified two donors to support the next Solar Suitcase deployment.

Electrochemical Arsenic Remediation (ECAR) for Safe Drinking Water: An Indian field representative, Sreeman Mypati, is currently visiting the US for one month. Mypati is coordinating design discussions for the ECAR reactor and assisting in the lab to learn rigorous experimental techniques that he will then bring to the field trial.

Collective Assessment & Feedback Engine (CAFÉ): The team is currently designing implementations of CAFÉ for use in Brazil and Rwanda. In Brazil, the team is in discussions with the Council on Science and Technology in Rio de Janeiro to develop a local version that will allow individuals to advise the government on timely policy issues. In Rwanda, the team is working with faculty at the University of Rwanda to design CAFÉ for assessing neonatal and antenatal healthcare service programs in rural community health centers.

Affordable Recycled Modular Roofs: During the scope of the grant (2014 - 2015) the team will understand and optimize tile strength as a function of density and thickness, develop and field test a biomimetic environmentally friendly chemical additive to increase water resistance and develop an improved energy efficient method to quickly dry tiles which will significantly reduce manufacturing costs.

High-Resolution Development Indicators: In 2014, the team will begin collecting phone and face-to-face survey data with a large population of mobile phone users in Afghanistan. The team will also begin the time-intensive process of linking data from these surveys to anonymous records of phone use.

Information and Intermittent Water: In Summer 2014, the research team will conduct qualitative research on the organizational and political factors in Bangalore that may influence the effects of Nextdrop's services. The team will then conduct a household baseline survey in Bangalore.

7.2 Innovation Pipeline

DIL's Spring 2014 Innovate competition, hosted by the Policy Design and Evaluation Lab (PDEL) at UCSD, will announce all awards in June 2014. This round of project will focus on innovative use of ICT to address development problems. The novel technology to be funded may be an *intervention* (meaning ICT is being used to provide a new service), an *observation tool* (meaning that outcomes are being captured using ICT), or both.

Selected projects will receive 'proof of concept' grants (up to $50,000) to prototype and field-test novel technologies, to perform feasibility or market studies for new products, to pilot an evaluation, or to conduct an entire evaluation in cases where institutional data are available. More mature projects will be awarded up to $200,000 to demonstrate the viability of a technology or approach using a well-defined research strategy. Full project applications may cover the costs of a larger pilot as a product moves to scale, or partial funding for a full evaluation.

As DIL concludes its Spring 2014 competitions, the management team will continually seek new strategies and systems to streamline administrative processes and improve its support to awarded projects. The Lab continues to document best practices and lessons learned for application in future Requests for Applications (RFAs).

The next rounds of both DIL Innovate and Explore competitions will be in Fall 2014, with RFAs crafted and released over the summer.

7.3 Measuring Impact

The Mezuri team will continue development of the DIL data platform, with the goal of having a complete end-to-end flow of real-world sensor data through a V0.1 prototype back-end, including cloud-based database storage, data processing, and complete data path tracking from sensor to server with appropriate metadata to keep track of provenance.

The TIER group at UCB will continue to coordinate and lead the technology integration and development. TIER will also continue to identify and integrate real-world use cases into the project for purposes of defining feature requirements and supplying sample data. This includes co-deploying the TIER-Michigan Grid Watch monitoring software within REPP in Kenya. The team will also pursue discussions with large technology companies to jointly co-deploy Grid Watch in other regions.

The PSU team has been busy producing 550 sensors for deployment in projects around the world. Of these, 250 sensors are destined for hand pumps in Rwanda with Living Water International, 200 for DelAgua Health in Rwanda, and 150 for a Centers for Disease Control project in Kenya. As part of DIL, the team is producing "hidden" sensors in water filters to study behavioral reactivity within a health randomized controlled trial in Rwanda.

Mezuri's team at UM will focus on two areas in the immediate future: (i) better support for delay and disruption tolerant networking to support data collection from the field and (ii) streaming support in Mezuri to support the analytics workloads that the sensor applications described in Section 1.6 require.

The UW team will continue their current work on integrating ODK Sensors with ODK Tables, so that data from sensors can be routed into the same database (and use the same synchronization mechanism back to the server) as all of ODK's other data collection systems. By utilizing the same pipeline, it will be possible to visualize that data on both mobile devices and a server dashboard, generating graphs using the powerful D3 data visualization package. Additionally, they are working on developing simple transformations from one data schema to another on the server side so that data tables can be easily updated with new columns.

7.4 Ecosystem for Development Engineering

DIL is in conversations with the HESN team about co-hosting the 2014 HESN Technical Convening at UC Berkeley. The technical convening will bring together the HESN Development Labs, USAID, and other relevant stakeholders to highlight the work of each Lab. Given Berkeley's proximity to Silicon Valley, the second annual HESN TechCon will also actively engage the private sector and other firms based in the San Francisco Bay Area.

The Lab will continue to support and foster innovation by connecting on-campus innovators and social entrepreneurs with outside experts to help support them through the innovation pipeline. In addition to monthly DIL Salons and biweekly Practitioner in Residence sessions, the staff will launch a new monthly workshop series to provide researchers with technical support on Institutional Review Board (IRB) approval, pro-poor intellectual property management, media communications, and M&E. The workshops will be shaped around the needs of DIL's constituents at Berkeley and elsewhere.

The Dev Eng Research in Action series will continue into the 2014-2015 academic year. This seminar, designed to be offered each spring term, will focus on work-in-progress presentations by the students, as well as faculty and guest lecturers. Students enrolled in the Dev Eng designated emphasis will be required to complete at least one semester of the seminar.